

WHAT IS CLAIMED IS:

1 1. A purified nucleic acid molecule, comprising a
2 nucleic acid sequence encoding SEQ ID NO.: 2.

1 2. The purified nucleic acid molecule of claim 1,
2 which is a cDNA molecule.

1 3. The purified nucleic acid molecule of claim 2,
2 which comprises the sequence of SEQ ID NO.: 1.

1 4. A purified nucleic acid, wherein said nucleic acid
2 is capable of hybridizing at high stringency to a probe of
3 400 contiguous nucleotides from SEQ ID NO.: 1 over the entire
4 length of said probe.

1 5. A purified nucleic acid, comprising a sequence that
2 encodes a protein that is at least 90% homologous to the
3 entire length of amino acid sequence of SEQ ID NO.: 2.

1 6. The purified nucleic acid of claim 5, wherein the
2 protein is at least 95% homologous to SEQ ID NO.: 2.

1 7. The purified nucleic acid of claim 5, wherein the
2 protein is at least 98% homologous to SEQ ID NO.: 2.

1 8. A purified protein, comprising a sequence that is
2 at least 80% homologous to the entire length of SEQ ID NO.:
3 2.

1 9. The purified protein of claim 8, wherein the
2 sequence is at least 90% homologous to SEQ ID NO.: 2.

1 10. The purified protein of claim 9, wherein the
2 sequence is at least 95% homologous to SEQ ID NO.: 2.

1 11. The purified protein of claim 9, wherein the
2 sequence is at least 98% homologous to SEQ ID NO.: 2.

1 12. The purified protein of claim 9, wherein the
2 sequence is SEQ ID NO.: 2.

A method for targeting genes having specific phenotypic characteristics comprising the steps of:

- selecting one or more phenotypic characteristics;
- selecting a gene sequence that encodes the selected phenotypic characteristics;
- selecting one or more genes from a cataloged gene sequences;
- comparing the selected gene sequence with the cataloged gene sequences;
- extracting any cataloged gene sequences that share a portion of the selected gene sequence;
- aligning the selected gene sequence with the extracted gene sequence;
- prioritizing the extracted gene sequences based on the alignment of the selected gene sequence with the extracted gene sequences;
- selecting at least one of the prioritized gene sequences based on one or more phenotypic characteristics;
- designing one or more degenerate primers for the selected-prioritized gene sequence;

1 14. The method as recited in claim 13, further
2 comprising the step of filtering the prioritized gene
3 sequences.

1 15. The method as recited in claim 14, wherein the step
2 of filtering the prioritized gene sequences removes
3 vertebrate sequences but not invertebrate derived sequences.

1 16. The method as recited in claim 13, further
2 comprising the step of cloning genetic material using the one
3 or more degenerate primers.

1 17. The method as recited in claim 13, wherein the one
2 or more databases are selected from cataloged gene sequences
3 for humans, rats, mice, zebra fish, frogs, Drosophila,
4 nematode, C. elegans, mosquito and bacteria.

1 18. The method as recited in claim 13, wherein the
2 phenotypic characteristics include insect mid-gut epithelial
3 cell encoded proteins.

SUB A2
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19. The method as recited in claim 13, wherein the one
or more degenerate primers are nested.

20. The method as recited in claim 13, wherein the one
or more degenerate primers is used to clone target molecules.

21. The method as recited in claim 13, wherein the one
or more degenerate primers is used to clone biopesticide
encoding genes.

22. The method as recited in claim 13, wherein the one
or more degenerate primers is used to clone therapeutic
encoding genes.

23. The method as recited in claim 13, wherein the step
of prioritizing the extracted gene sequences based on the
alignment of the selected gene sequence is accomplished by
using a statistical analysis of the alignment.

24. The method as recited in claim 13, wherein the step
of aligning the selected gene sequences to each extracted

3 gene sequence ~~is~~ accomplished using a local alignment search
4 tool.

1 25. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by amino acid sequences.

1 26. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by nucleic acid sequences.

1 27. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by genomic DNA.

1 28. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by open reading frames.

1 29. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by introns.

1 30. The method as recited in claim 13, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by introns and exons.

1 31. The method as recited in claim 13, wherein the one
2 or more phenotypic criteria excludes genes encoded by
3 mammals.

1 32. The method as recited in claim 13, wherein the one
2 or more phenotypic criteria excludes genes encoded by zebra
3 fish or frogs.

1 33. The method as recited in claim 13, wherein the one
2 or more phenotypic criteria excludes genes encoded by
3 invertebrates.

1 34. A system for targeting gene sequences having one
2 or more characteristics comprising:

3 a computer having program means thereon for selecting
4 one or more phenotypic characteristics, selecting a gene
5 sequence that is known to have the selected phenotypic
6 characteristics, comparing the selected gene sequence to the
7 cataloged gene sequences, extracting any cataloged gene

8 sequences that contain a portion of the selected gene
9 sequence, aligning the selected gene sequence to each portion
10 of the extracted gene sequence, prioritizing the extracted
11 gene sequences based on the alignment of the selected gene
12 sequence, selecting at least one of the prioritized gene
13 sequences based on one or more phenotypic criteria, and
14 designing one or more degenerate primers to target the
15 selected-prioritized gene sequences;

16 one or more databases containing the cataloged gene
17 sequences; and

18 a communication link connecting the computer to said one
19 or more databases.

1 35. The system as recited in claim 34, further
2 comprising:

3 at least one other computer, connected to said computer,
4 said at least one other computer having said program means
5 thereon for selecting one or more phenotypic characteristics,
6 selecting a gene sequence that is known to have the selected
7 phenotypic characteristics, comparing the selected gene
8 sequence to the cataloged gene sequences, extracting any
9 cataloged gene sequences that contain a portion of the
10 selected gene sequence, aligning the selected gene sequence

11 to each portion of the extracted gene sequence, prioritizing
12 the extracted gene sequences based on the alignment of the
13 selected gene sequence, selecting at least one of the
14 prioritized gene sequences based on one or more phenotypic
15 criteria, and designing one or more degenerate primers to
16 target the selected-prioritized gene sequences.

1 36. The system as recited in claim 34 or 35, wherein
2 the program means on said computer filters the prioritized
3 gene sequences.

1 37. The system as recited in claim 36, wherein the
2 program means on said computer removes vertebrate sequences
3 but not invertebrate derived sequences when the prioritized
4 sequences are filtered.

1 38. The system as recited in claim 36, further
2 comprising an apparatus that clones genetic material using
3 one or more degenerate primers.

1 39. The system as recited in claim 36, wherein the one
2 or more databases are selected from cataloged gene sequences

3 for humans, rats, mice, zebra fish, frogs, Drosophila,
4 nematode, C. elegans, mosquito and bacteria.

SUB A6
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2 40. The system as recited in claim 36, wherein the
3 phenotypic characteristics include insect mid-gut epithelial
cell encoded proteins.

1 41. The system as recited in claim 36, wherein the one
2 or more degenerate primers are nested.

1 42. The system as recited in claim 36, wherein the one
2 or more degenerate primers is used to clone target molecules.

1 43. The system as recited in claim 36, wherein the one
2 or more degenerate primers is used to clone biopesticide
3 encoding genes.

1 44. The system as recited in claim 36, wherein the one
2 or more degenerate primers is used to clone therapeutic
3 encoding genes.

SUB A7

1 45. The system as recited in claim 36, wherein the
2 program means on said computer uses a statistical analysis

SVB A7
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3 of the alignment of the selected gene sequence to prioritize
4 the extracted gene sequences.

1 46. The system as recited in claim 36, wherein the
2 program means on said computer uses a local alignment search
3 tool to align the selected gene sequence to each extracted
4 gene sequence.

1 47. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by amino acid sequences.

1 48. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by nucleic acid sequences.

1 49. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by genomic DNA.

1 50. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by open reading frames.

1 51. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by introns.

1 52. The system as recited in claim 36, wherein the
2 selected gene sequence is aligned to each extracted gene
3 sequence by introns and exons.

1 53. The system as recited in claim 36, wherein the one
2 or more phenotypic criteria excludes genes encoded by
3 mammals.

1 54. The system as recited in claim 36, wherein the one
2 or more phenotypic criteria excludes genes encoded by zebra
3 fish or frogs.

1 55. The system as recited in claim 36, wherein the one
2 or more phenotypic criteria excludes genes encoded by
3 invertebrates.

1 56. The system as recited in claim 36, wherein said
2 system may be used for high specificity primer selection.

1 58. The system as recited in claim 36, wherein said
2 system may be used for high throughput database conversion.

1 59. The system as recited in claim 36, wherein said
2 system may be used for high throughput positioning of motifs.

1 60. A computer program embodied on a computer-readable
2 medium for targeting gene sequences having one or more
3 phenotypic characteristics, said computer program comprising:

4 first selecting means for selecting one or more
5 phenotypic characteristics of said gene sequences;

6 second selecting means for selecting a gene sequence
7 that is known to have said one or more of said selected
8 phenotypic characteristics;

9 third selecting means for selecting at least one
10 database containing cataloged gene sequences therein;

11 extracting means for extracting from said at least one
12 database a plurality of cataloged gene sequences containing
13 a portion of the said given gene sequence;

14 aligning means for aligning said given gene sequence to
15 respective ones of said cataloged gene sequence;

16 prioritizing means for prioritizing the respective ones
17 of the extracted gene sequences based on the alignment of the
18 given gene sequence;

19 fourth selecting means for selecting at least one of the
20 prioritized gene sequences based on one or more phenotypic
21 criteria; and

22 designing means for designing one or more degenerate
23 primers to target said at least one selected gene sequence.

1 61. The computer program as recited in claim 60,
2 further comprising a code segment for filtering the
3 prioritized gene sequences.

1 62. The computer program as recited in claim 61,
2 wherein the code segment for filtering the prioritized gene
3 sequences removes vertebrate sequences but not invertebrate
4 derived sequences.

1 63. The computer program as recited in claim 60,
2 further comprising a code segment for cloning genetic
3 material using the one or more degenerate primers.

1 64. The computer program as recited in claim 60,
2 wherein the one or more databases are selected from cataloged
3 gene sequences for humans, rats, mice, zebra fish, frogs,
4 Drosophila, nematode, C. elegans, mosquito and bacteria.

1 65. The computer program as recited in claim 60,
2 wherein the phenotypic characteristics include insect mid-gut
3 epithelial cell encoded proteins.

1 66. The computer program as recited in claim 60,
2 wherein the one or more degenerate primers are nested.

1 67. The computer program as recited in claim 60,
2 wherein the one or more degenerate primers is used to clone
3 target molecules.

1 68. The computer program as recited in claim 60,
2 wherein the one or more degenerate primers is used to clone
3 biopesticide encoding genes.

1 69. The computer program as recited in claim 60,
2 wherein the one or more degenerate primers is used to clone
3 therapeutic encoding genes.

1 70. The computer program as recited in claim 60,
2 wherein the code segment for prioritizing the extracted gene
3 sequences based on alignment of the selected gene is
4 accomplished by using a statistical analysis of the
5 alignment.

1 71. The computer program as recited in claim 60,
2 wherein the code segment for prioritizing the extracted gene
3 sequences based on alignment of the selected gene is
4 accomplished by using a local alignment search tool.

1 72. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by amino acid sequences.

1 73. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by nucleic acid sequences.

1 74. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by genomic DNA.

1 75. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by open reading frames.

1 76. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by introns.

1 77. The computer program as recited in claim 60,
2 wherein the selected gene sequence is aligned to each
3 extracted gene sequence by introns and exons.

1 78. The computer program as recited in claim 60,
2 wherein the one or more phenotypic criteria excludes genes
3 encoded by mammals.

1 79. The computer program as recited in claim 60,
2 wherein the one or more phenotypic criteria excludes genes
3 encoded by zebra fish or frogs.

1 80. The computer program as recited in claim 60,
2 wherein the one or more phenotypic criteria excludes genes
3 encoded by invertebrates.

1 81. An article of manufacture comprising a computer
2 usable medium having computer readable program code means
3 embodied therein for targeting gene sequences, the computer
4 readable program code means in said article of manufacture
5 comprising:

6 computer readable code means for selecting one or more
7 phenotypic characteristics;

8 computer readable code means for selecting a gene
9 sequence that is known to have the selected phenotypic
10 characteristics;

11 computer readable code means for selecting one or more
12 databases containing cataloged gene sequences;

13 computer readable code means for comparing the selected
14 gene sequence to the cataloged gene sequences;

15 computer readable code means for extracting any
16 cataloged gene sequences that contain a portion of the
17 selected gene sequence;

18 computer readable code means for aligning the selected
19 gene sequence to each portion of the extracted gene sequence;
20 computer readable code means for prioritizing the
21 extracted gene sequences based on the alignment of the
22 selected gene sequence;
23 computer readable code means for selecting at least one
24 of the prioritized gene sequences based on one or more
25 phenotypic criteria; and
26 computer readable code means for designing one or more
27 degenerate primers to target the selected-prioritized gene
28 sequences.

1 82. The article of manufacture of claim 81, wherein
2 said article of manufacture is stored on a medium selected
3 from a group consisting of:
4 a server, a hard drive, a CD-ROM and a diskette.